

CLAIMS

1. Gas turbine electric power generation equipment comprising: a humidifier for increasing at least one of a quantity of steam, relative humidity, and absolute humidity of air; a combustor for generating combustion gas by humidified air obtained by said humidifier and fuel; a turbine driven by the combustion gas generated by said combustor; an electricity generator driven by said turbine to generate electricity; and a water recovery unit for cooling the burned exhaust gas discharged from said turbine to recover moisture in said burned exhaust gas, said equipment further comprising:

an exhaust gas reheater for heating the burned exhaust gas discharged from said water recovery unit by surplus water left in that used for increasing the quantity of steam or relative humidity or absolute humidity of air by said humidifier.

2. Gas turbine electric power generation equipment comprising: a humidifier for increasing at least one of a quantity of steam, relative humidity, and absolute humidity of air; a combustor for generating combustion gas by humidified air obtained by said humidifier and fuel; a turbine driven by the combustion gas generated by said combustor; an electricity generator driven by said turbine

to generate electricity; and a water recovery unit for condensing moisture in the burned exhaust gas discharged from said turbine, said equipment further comprising:

a heat exchanger for heat-exchanging between surplus water left in that for increasing the quantity of steam or relative humidity or absolute humidity of air by said humidifier and the burned exhaust gas discharged from said water recovery unit.

3. Gas turbine electric power generation equipment comprising: a compressor for compressing air; a humidifier for adding moisture to the compressed air obtained by said compressor; a combustor for generating combustion gas by humidified air obtained by said humidifier and fuel; a turbine driven by the combustion gas generated by said combustor; an electricity generator driven by said turbine to generate electricity; a regenerator for heating said humidified air supplied to said combustor by the burned exhaust gas discharged from said turbine; a water heater for heating water supplied to said humidifier by the burned exhaust gas discharged from said regenerator; and a water recovery unit for cooling the burned exhaust gas discharged from said water heater to recover moisture in said burned exhaust gas, said equipment further comprising:

an exhaust gas reheater for heating the burned exhaust gas discharged from said water recovery unit by

surplus water discharged from said humidifier, said water heater heating the surplus water discharged from said exhaust gas reheater to supply it to said humidifier.

4. The gas turbine electric power generation equipment of claim 3, wherein the surplus water discharged from said exhaust gas reheater is supplied to an inlet of said compressor.

5. The gas turbine electric power generation equipment of claim 3, wherein a part of water supplied to said humidifier is used to cool said turbine.

6. Gas turbine electric power generation equipment comprising: a humidifier for increasing at least one of a quantity of steam, relative humidity, and absolute humidity of air; a combustor for generating combustion gas by humidified air obtained by said humidifier and fuel; a turbine driven by the combustion gas generated by said combustor; an electricity generator driven by said turbine to generate electricity; a water heater for heating water supplied to said humidifier by heat of the burned exhaust gas discharged from said turbine; and a water recovery unit for cooling the burned exhaust gas discharged from said water heater to recover moisture in said burned exhaust gas, said equipment further comprising:

an exhaust gas reheater for heating the burned exhaust gas discharged from said water recovery unit by a

part of water obtained by being heated by said water heater.

7. Gas turbine electric power generation equipment comprising: a humidifier for increasing at least one of a quantity of steam, relative humidity, and absolute humidity of air; a combustor for generating combustion gas by humidified air obtained by said humidifier and fuel; a turbine driven by the combustion gas generated by said combustor; an electricity generator driven by said turbine to generate electricity; a first heat exchanger for heat-exchanging between the burned exhaust gas discharged from said turbine and water supplied to said humidifier; and a water recovery unit for condensing moisture in the burned exhaust gas discharged from said first heat exchanger, said equipment further comprising:

a second heat exchanger for heat-exchanging between a part of water obtained by said first heat exchanger and the burned exhaust gas discharged from said water recovery unit.

8. Gas turbine electric power generation equipment comprising: a compressor for compressing air; a humidifier for adding moisture to the compressed air obtained by said compressor; a combustor for generating combustion gas by humidified air obtained by said humidifier and fuel; a turbine driven by the combustion gas generated by said combustor; an electricity generator driven by said turbine

to generate electricity; a regenerator for heating said humidified air supplied to said combustor by the burned exhaust gas discharged from said turbine; a water heater for heating water supplied to said humidifier by the burned exhaust gas discharged from said regenerator; and a water recovery unit for cooling the burned exhaust gas discharged from said water heater to recover moisture in said burned exhaust gas, said equipment further comprising:

an exhaust gas reheater for heating the burned exhaust gas discharged from said water recovery unit by a part of water obtained by being heated by said water heater, said water heater heating waste water discharged from said exhaust gas reheater to supply it to said humidifier.

9. Gas turbine electric power generation equipment comprising: a humidifier for increasing at least one of a quantity of steam, relative humidity, and absolute humidity of air; a combustor for generating combustion gas by humidified air obtained by said humidifier and fuel; a turbine driven by the combustion gas generated by said combustor; and an electricity generator driven by said turbine to generate electricity.

wherein said humidifier causes steam having pressure as high as said air to merge with said air to increase at least one of a quantity of steam, relative humidity, and absolute humidity of said air.

10. The gas turbine electric power generation equipment of claim 9, wherein said steam is saturated steam.

11. Gas turbine electric power generation equipment comprising: a humidifier for increasing at least one of a quantity of steam, relative humidity, and absolute humidity of air; a combustor for generating combustion gas by humidified air obtained by said humidifier and fuel; a turbine driven by the combustion gas generated by said combustor; and an electricity generator driven by said turbine to generate electricity,

wherein said humidifier comprises an expanding portion for expanding compressed water higher in pressure than said air to pressure as high as said air, and a mixing portion for mixing steam obtained in said expanding portion with said air.

12. Gas turbine electric power generation equipment comprising: a humidifier for increasing at least one of a quantity of steam, relative humidity, and absolute humidity of air; a combustor for generating combustion gas by humidified air obtained by said humidifier and fuel; a turbine driven by the combustion gas generated by said combustor; and an electricity generator driven by said turbine to generate electricity,

wherein said humidifier comprises a flow path through which said air flows, and a vaporizing portion

communicated with said flow path to jet and vaporize compressed water higher in pressure than said air.

13. Gas turbine electric power generation equipment comprising: a humidifier for increasing at least one of a quantity of steam, relative humidity, and absolute humidity of air; a combustor for generating combustion gas by humidified air obtained by said humidifier and fuel; a turbine driven by the combustion gas generated by said combustor; and an electricity generator driven by said turbine to generate electricity,

wherein said humidifier comprises a partitioning means whose part is opened to partition the interior of said humidifier, said air is introduced into one partitioned by said partitioning means, and compressed water higher in pressure than said air is jetted on the other partitioned by said partitioning means.

14. The gas turbine electric power generation equipment of claim 13, wherein said partitioning means divides the interior of said humidifier in substantially straight direction relative to the introducing direction of said air.

15. Gas turbine electric power generation equipment comprising: a compressor for compressing air; a humidifier for adding moisture to the compressed air obtained by said compressor; a combustor for generating combustion gas by

humidified air obtained by said humidifier and fuel; a turbine driven by the combustion gas generated by said combustor; an electricity generator driven by said turbine to generate electricity; a regenerator for heating said humidified air supplied to said combustor by the burned exhaust gas discharged from said turbine; a water heater for heating water supplied to said humidifier by the burned exhaust gas discharged from said regenerator; and a water recovery unit for cooling the burned exhaust gas discharged from said water heater to recover moisture in said burned exhaust gas,

wherein said humidifier comprises a flow path through which said compressed air flows, and a gas and liquid separating portion communicated with said flow path to jet water heated by said water heater to separate it into steam and water, and said equipment further comprises a heat exchanger for heat-exchanging between water separated by said gas and liquid separating portion and the burned exhaust gas discharged from said water recovery unit.

16. A humidifier for adding moisture to air supplied to a combustor comprising a partitioning means whose part is opened to partition the interior of said humidifier, an introducing port for introducing said air into one partitioned by said partitioning means, and a nozzle for jetting water into the other partitioned by said



partitioning means.

17. A humidifier for increasing at least one of a quantity of steam or relative humidity or absolute humidity of a working fluid of a turbine comprising a partitioning means whose part is opened to partition the interior of said humidifier, an introducing port for introducing said working fluid into one partitioned by said partitioning means, and a nozzle for jetting water into the other partitioned by said partitioning means.